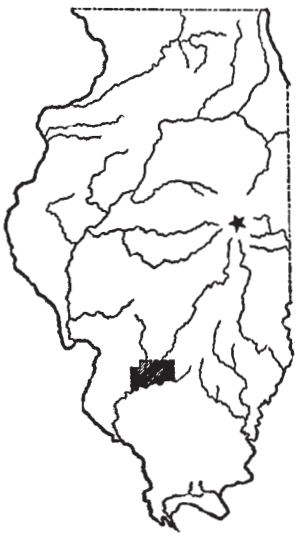
UNIVERSITY OF ILLINOIS
Agricultural Experiment Station

SOIL REPORT No. 57

CLINTON COUNTY SOILS

By E. A. NORTON, R. S. SMITH, AND L. H. SMITH



URBANA, ILLINOIS, JULY, 1936

"It must be remembered that the productive power of the soil is the basic support of all prosperity."

C. G. HOPKINS

"It is the duty of every landowner to see that his land when he leaves it is as good or better than when he received it."

J. G. MOSIER

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INTRODUCTORY NOTE

IT IS A MATTER of common observation that soils vary tremendously in their productive power, depending upon their physical condition, their chemical composition, and their biological activities. For the most advantageous utilization of the land a definite knowledge of the existing kinds or types of soil is a first essential, and for any comprehensive plans for the improvement and the maintenance of our agricultural soils this knowledge is likewise necessary. It is the purpose of a soil survey to classify the various kinds of soil of a given area in such a manner as to permit definite characterization for description and for mapping. With the information that such a survey affords, every farmer or landowner of the surveyed area has at hand the basis for a rational system of improvement of his land. At the same time the Experiment Station is furnished an inventory of the soils of the state upon which intelligently to base plans for those fundamental investigations so necessary for solving the problems of practical soil improvement.

This county soil report is one of a series reporting the results of the soil survey which, when completed, will cover the state of Illinois. Each county report is intended to be as nearly complete in itself as it is practicable to make it, even at the expense of some repetition.

While the authors must assume the responsibility for the presentation of this report, it should be understood that the material for it represents the contribution of a considerable number of the present and former members of the Agronomy Department working in their respective lines of soil mapping, soil analysis, and experiment field investigation. In this connection special recognition is due Mr. D. C. Maxwell, who, as a leader of the field party, was in direct charge of the mapping.

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CLINTON COUNTY SOILS

By E. A. NORTON, R. S. SMITH, and L. H. SMITH[1]

GEOGRAPHICAL FEATURES

CLINTON COUNTY lies in the southwest part of Illinois, with its center about fifty miles due east of St. Louis, Missouri. It is roughly rectangular in shape, being about 16 miles wide and 30 miles long. It occupies an area of 497.06 square miles.

The first settlements in the region were established along Kaskaskia river early in the nineteenth century, and the county came into legal existence by state legislative act in 1824. Carlyle was made the county seat. By 1830, according to the United States Census Report, there were about 2,300 inhabitants. The number gradually increased, and in 1930 more than 21,000 were reported (Fig. 1). The population is dominantly rural and a majority are of German descent.

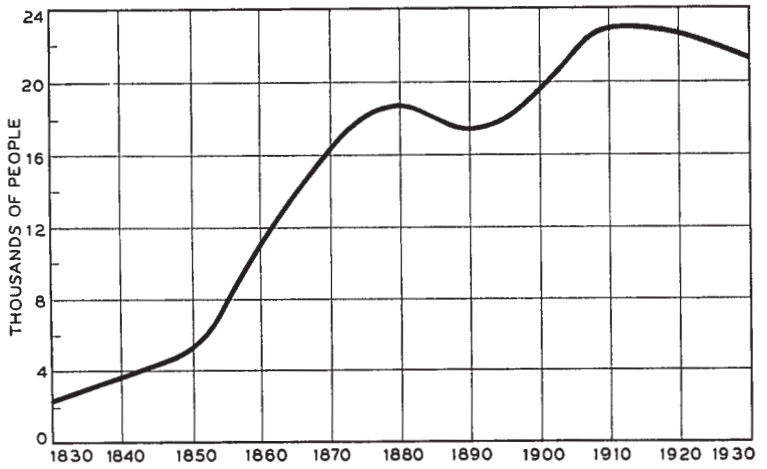

FIG. 1.—GROWTH OF POPULATION IN CLINTON COUNTY

At the time of the first U. S. Census in 1830, Clinton county had about 2,300 inhabitants. A hundred years later the number had increased to about 21,000. Like other counties in Illinois that are predominantly rural, there has been a material decline in population during the past one or two decades coincident with the increases taking place in urban centers. (Figures from U. S. Census)

The facilities for marketing agricultural products are well established. Two main trunk-line railroads traverse the county east and west and a north-south line cuts across the east side of the county. Auto trucks carry most of the livestock and dairy products over paved highways to the St. Louis market. Three

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paved highways have been constructed in Clinton county, the routes of which are shown on the soil map; a fourth one not shown on the map now extends southwest from Carlyle. The dirt roads are, for the most part, kept in fairly good condition.

Agricultural Production

Agriculture was the first, and has continued to be, the chief economic interest of Clinton county. Winter wheat is the outstanding field crop from the standpoint both of acreage and of value. The area given over to wheat production averages about 55,000 acres, altho the acreage fluctuates widely from year to

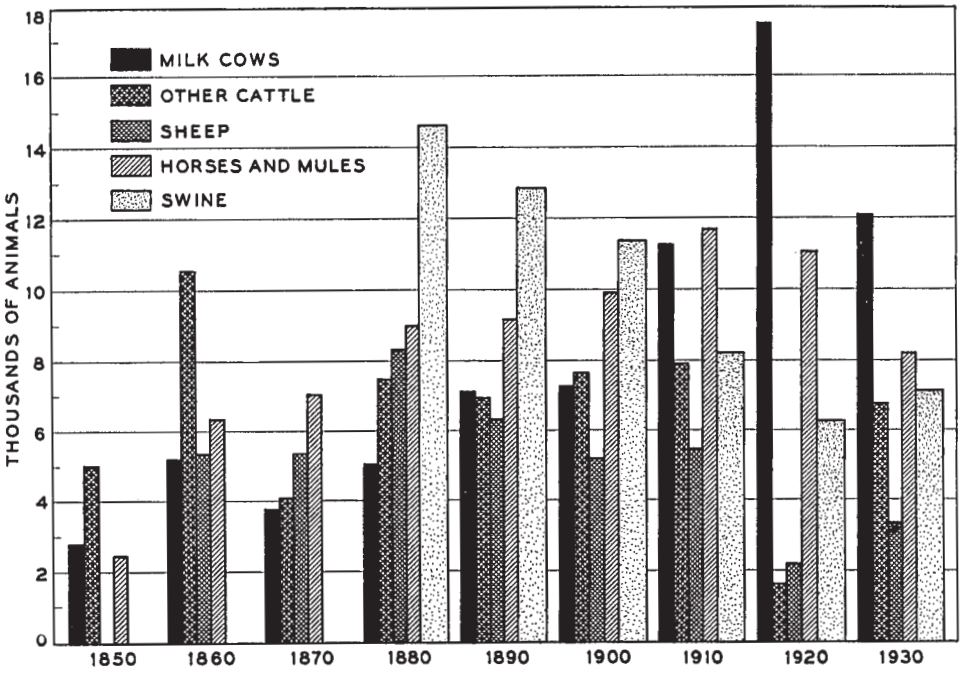

FIG. 2.—PRODUCTION OF PRINCIPAL CLASSES OF LIVESTOCK IN CLINTON COUNTY

The rapid rise of the dairy industry in this section of the state is evidenced by the pronounced increase in number of dairy cows, particularly since 1900. The decline in horses and mules in recent years is characteristic of the trend thruout the country resulting from the increasing use of mechanical power. The bar representing number of swine is proportioned by reducing the length one-half and doubling the width. The number of swine has steadily decreased from about 15,000 at the first enumeration in 1880 to about 9,000 in 1930. The number of sheep, which was around five or six thousand for half a century, has fallen off about half since 1900. (Figures from U. S. Census)

year. The rate of yield is likewise extremely variable, ranging in a ten-year period from about 7 bushels an acre to 25 bushels with the average at 14 bushels.

About 46,000 acres, on the average, are devoted to corn production, and the average annual yield for a ten-year period has been 28.6 bushels an acre. This figure also fluctuates widely, one year running as high as 38 bushels an acre and another year falling as low as 14 bushels. These figures illustrate the great seasonal climatic variations in this region. About 38,000 acres, on the average,

are given over to oat production and the average annual yield is 27 bushels an acre. Very little barley or rye is seeded.

The acreage of legume crops has expanded remarkably during the last fifteen years. Clinton county now has, on the average, about 20,000 acres of sweet clover, 3,000 acres of alfalfa, 3,500 acres of soybeans, and 3,000 acres of cowpeas. These crops are especially valuable in connection with dairy farming but they might well take an important place in the cropping program of every farm where the soil type will permit their economic production.

Considerable acreage is devoted to the production of fruit. In 1929 there were produced, according to the U. S. Census Report, 19,024 bushels of apples, 33,533 bushels of peaches, and 10,234 bushels of pears. Grapes, dewberries, and strawberries were the most important small fruits marketed. Vegetable crops are given so little attention as to be of no great commercial importance.

Some conception of the livestock interests of Clinton county, both past and present, may be gained from Fig. 2, in which the number of horses and mules, cattle, sheep, and swine are represented graphically at ten-year intervals beginning with the year 1850. Dairy cattle have increased in number in recent years much more rapidly than have other cattle, and Clinton county has become one of the outstanding dairy counties of southern Illinois. Nearly 6 million gallons of whole milk went to market from this county in 1929.

A sharp decline in the number of horses and mules since 1920 indicates the rapid replacement of animal by motor power on the farm as well as in town during this time. Few sheep have been kept in Clinton county at any time, and the number in recent years is even considerably less than that of a half-century ago. The interest in swine production appears likewise to be diminishing. Poultry and egg production are important sources of income.

Climate

The humid, temperate climate of Clinton county is characterized by a wide range in temperature between the extremes of winter and summer and a somewhat irregularly distributed rainfall. The mean summer temperature during the nineteen-year period from 1914 to 1932 inclusive, as taken from the records of the Greenville Weather Station located some ten miles north of Clinton county, was 75.6° F., while that of winter was 34.8° F. The highest temperature recorded during this period was 110° F. observed in July, 1930, and the lowest was 20° F. below zero, in January of that same year, thus giving a spread within a single year of 130 degrees.

The average date of the last killing frost in spring during the nineteen-year period was April 20; the earliest in the fall, October 27, giving an average frost-free season of 190 days. The shortest growing season recorded was 137 days in 1925 and the longest, 229 days in 1922. The average length of growing season in this region gives ample time to mature the crops commonly grown, but occasionally, when the spring is wet and planting delayed, early frosts catch such crops as corn and soybeans before they have fully matured.

The average annual rainfall recorded at the Greenville Station during the above mentioned nineteen-year period was 35.75 inches. The yearly rainfall varied from a minimum of about 26 inches to a maximum of slightly more than

47 inches. Likewise there is a great variation in the rainfall for the growing season—April thru September—the amounts for the different years ranging from 13 to 33 inches. The total seasonal rainfall, however, is not so significant a factor of moisture supply for growing crops as is its distribution over the season. Other important factors to be considered in this connection are the moisture requirements of the crop, the moisture absorbing and holding capacity of the soil, and the rate of evaporation.

The occurrence of protracted rainless periods during the growing season in this section is brought out in a study of the Greenville rainfall records shown in Fig. 3. This chart indicates the distribution of rainfall thruout the growing season for a ten-year period. The shaded spaces show the number of consecutive

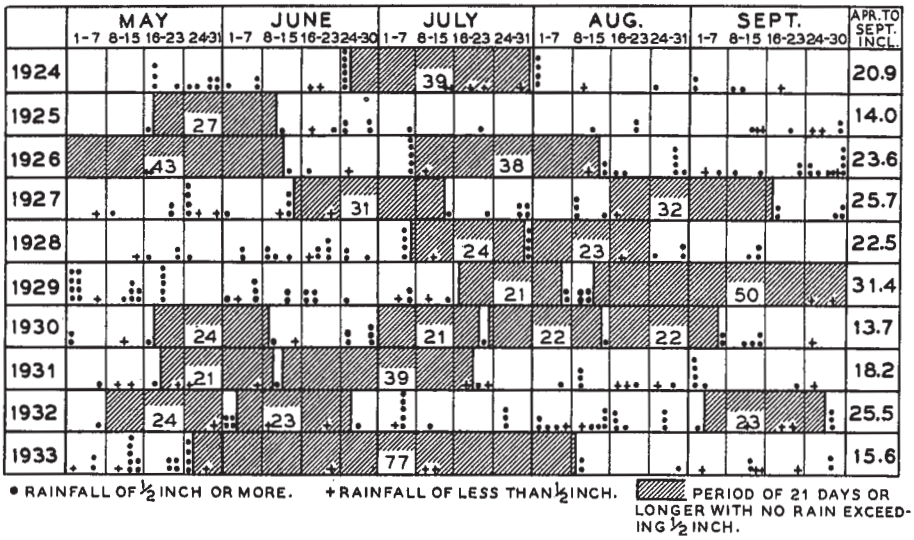

FIG. 3.—DISTRIBUTION OF RAINFALL DURING TEN GROWING SEASONS, 1924-1933

The shaded bars indicate periods of 21 consecutive days, or longer, during which not more than one-half inch of rain fell in any twenty-four hour period.

days unbroken by a rain of more than .5 inch. The solid circular spots represent .5 inch of rainfall and the crosses indicate rains of less than .5 inch. This distinction in the amount of rain falling at any given time is made on the assumption that ordinarily a rain of less than half an inch is ineffective, which, however, is not always strictly true. The chart brings out the fact that nearly every year there are one or more rainless periods of sufficient length to produce drouthy conditions harmful to growing crops.

It is interesting to note that an average corn yield of 13 bushels an acre was reported in Clinton county in the year 1930 when four of these rainless periods occurred. On the other hand, a 38-bushel corn yield was reported both in 1931 and 1932, when abundant rains fell in the critical growing period.

Topography and Drainage

The land surface of Clinton county is generally smooth, and no great differences in elevation occur. The altitudes of a few locations in the county are as

follows: Carlyle, 470 feet above sea level; Trenton, 497 feet; Aviston, 467 feet; Keyesport, 474 feet.

Clinton county lies wholly within the Kaskaskia river drainage basin. This stream, together with its numerous tributaries which are well distributed over the county, provides numerous outlets for the removal of excess surface water, but, on account of the nearly level topography and the impervious nature of the

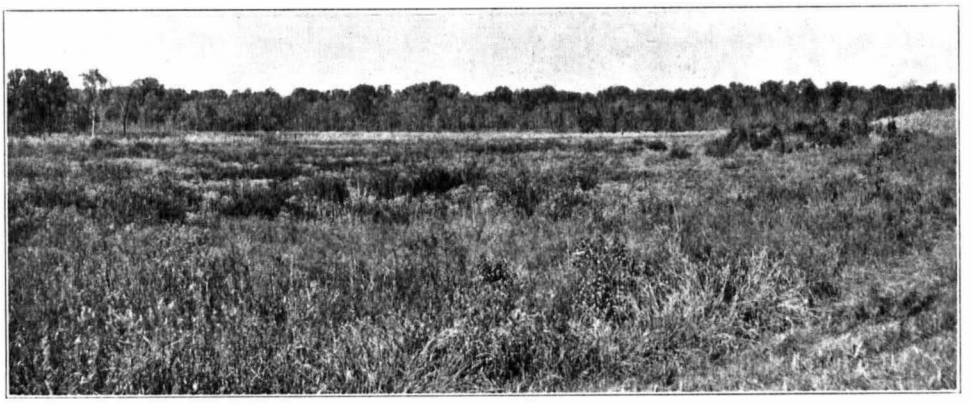

FIG. 4.—A TYPICAL PIECE OF CLINTON COUNTY BOTTOM LAND

The most extensive soil type in Clinton county, Bonnie silt loam, occupies the broad bottoms of the principal streams. It is usually covered by alternating swamp and timber, with here and there a small patch of corn.

subsoil, most of the upland drains slowly. The larger streams have wide, shallow valleys which flood frequently, except where protected by levees. Much of this bottom land drains slowly and is too wet and swampy to be cultivated (Fig. 4). Methods used to obtain better drainage are considered in the discussion of the individual soil types which follow.

FORMATION OF CLINTON COUNTY SOILS

Origin of Soil Material

The nature of Clinton county soils can be more readily understood by a knowledge of the formation and composition of the material from which they have been derived. The mineral material from which the soils of Clinton county were developed was deposited during the Glacial epoch, and it was thru action in Glacial times and subsequent erosion that the present topography was determined. The underlying bed rock, now exposed in a few places along the streams, served as a foundation for the loose, unconsolidated surface mantle and contributed only indirectly as the source of soil material.

The climate during the Glacial period was colder than at present. Snow and ice collected in regions to the north in such an amount that the mass pushed outward from centers of accumulation, forming glaciers. These glaciers advanced chiefly southward, aided by further accumulation of snow and ice at their margins until they reached a region where either the climate was warm enough to melt the ice as rapidly as it advanced or else its force had been spent. In moving

across the country from the far north, the ice gathered up all sorts and sizes of materials, including clay, sand, gravel, boulders, and even immense masses of rock. Some of these materials were carried hundreds of miles frozen in the ice. They rubbed against surface rocks and against each other until much of the material was ground into powder. The great bulk of material carried, however, was derived from the loose surface mantle and old bed-rock material and deposited within a few miles of its origin. Under the enormous pressure of the ice, hills were leveled off and old valleys filled in, thus greatly changing the features of the surface over which the ice passed and completely hiding the previous topography. The few knolls and ridges which appear prominent on the otherwise nearly level surface of Clinton county were made by glacial deposition. The deposit of rock material left by the glacier is known as glacial till, glacial drift, or boulder clay—terms which frequently appear in descriptions of soils.

There were four great periods during which ice sheets moved down from the north. The movements were separated by long intervals of time during which the climate was warm enough for the country to become clothed with vegetation. Probably only two glaciers covered Clinton county, the later one—the Illinoian, which was the third great ice advance—completely burying or destroying the deposits left by an earlier invasion.

Associated with the oncoming and withdrawal of an ice sheet was the accumulation of a silty, wind-blown deposit known as loess. This material was derived largely from the fine sediment deposited from the immense volumes of water which flowed from the melting ice. This water filled the drainage channels and overflowed adjacent lowlands. Following each flood stage, the water would recede and the sediment which had been deposited would dry and be picked up by the wind, blown over and redeposited on the upland as dust. Undoubtedly some fine material was also left directly on the surface by the receding ice and more accumulated as weathering broke down the larger particles. This material was also blown about when dry and it, together with that from the river valleys, collected as a blanket on the upland. Most of the loess deposited in Clinton county came from the Mississippi river valley, as is indicated by a thinning out of the material from west to east away from that bottom land. A slight thickening of the material occurs on the east bluff of Kaskaskia river, indicating that this bottom land furnished some of the sediment from which the loess was derived. The thickness of the loess in Clinton county, except where it has been removed by erosion, varies from a minimum of about 4 feet in the eastern part to a maximum of 12 feet in the western part of the county.

That the loess covering Clinton county was not deposited immediately following the withdrawal of the Illinoian ice is indicated by the fact that a soil was developed on the exposed drift surface before it was buried by the loess. The features of this old, buried, drift-derived soil show greater development than do corresponding features of the present soil. This fact indicates that the elapsed time between the retreat of the ice sheet and the deposition of loess was longer than that which has elapsed since the loess was deposited.

Altho the last glaciation, known as the Wisconsin, did not move far enough south to reach Clinton county, it did cover the headwaters of both Mississippi and Kaskaskia rivers and it must have furnished the sediment to these valleys

from which the most recent portion of the loess covering of Clinton county was derived.

It is well known locally that the soils become progressively more productive from east to west across Clinton county. This variation in productivity is explained by differences in the maturity or age of the soils. Older soils occur in the eastern part of the county due in part to the fact that the loess deposit from which they are developed is much thinner there than it is in the western part. Thin superjacent deposits, like the thin loess in eastern Clinton county, apparently weather rapidly and the soils developed on them mature quickly, particularly if the superjacent deposit is underlain by a previously weathered material, such as the Illinoian drift of this region. The loess in the western part of the county is thick enough so that the underlying Illinoian drift has had little influence on the present surface soil development. Another factor which has had some influence on the maturity of Clinton county soils is that loess continued to be deposited somewhat later in western Clinton county than it did in the eastern part.

Soil Development

Immediately upon the deposition of the soil material the soil-forming processes began to change it into soil. When first deposited, the raw loess was pale yellowish in color, of an open, porous nature, high in carbonates and amply supplied with the mineral elements of plant food. The weathering processes did not act alike everywhere because of differences in the slope of the land, in amounts of moisture present, in vegetation, and in certain other factors. The effect of these differences became more and more pronounced as the weathering action continued, until finally soil individuals or soil types, each with its own peculiar characteristics were evolved.

During the early stages in the life history of soils their distinguishing features are not clearly developed, and such soils are said to be young or to be in an early stage of development. The soils of Clinton county vary from young to old. Bottom-land soils and those receiving frequent deposition, as well as those subject to rapid erosion, are very young because the material has either just recently been deposited or else recently uncovered and in either case the weathering processes consequently have not had long to act. The upland soils, except those which have been eroded, vary in age from immature to old, owing to differences in the intensity of the action of the weathering forces and also to differences in the age of the soil material from which they have developed.

The changes which have taken place in the development of soils from the loess deposited in Clinton county have been exceedingly complex. Numerous processes have been at work breaking down the minerals in the soil material and freeing elements of plant food. Thru the solution and leaching of the more-or-less soluble constituents, including the limestone particles, an acid condition is developed and the soil becomes impoverished. The very fine clay particles, formed as the soil material weathers, move downward and, under conditions of slow subsurface drainage, accumulate in the subsoil, forming an almost impervious clay pan known locally as "hardpan."

Early in the history of the weathering of the soil material plant seeds were distributed by natural agencies and vegetation spread over the land. The simpler

forms of vegetation came first, followed by the higher plants as rapid chemical decomposition made an abundance of plant nutrients available. The growth of plants and the slow decay of their tissues resulted in the incorporation of more or less organic matter in the surface soil.

The original, nearly level surface was more favorable for the development of grass vegetation; but as streams were extended and drainage improved, forests began to encroach on the prairie. The extension of the forest continued until stopped by the clearing and tillage operations of the white man.

FIG. 5.—STUDYING THE SOIL PROFILE

One of the very pronounced characteristics observed in most soils is that they are composed of more or less distinct layers, or strata, often spoken of in soil literature as "horizons." The vertical section of the soil displaying the arrangement of these horizons from the surface down is called the "soil profile."

The grass vegetation, with its enormous quantity of surface roots, together with the original high lime and moisture content in the soil material, soon resulted in the accumulation of organic matter and the development of a dark-colored surface soil. At this early stage the soils of Clinton county were probably as productive as any now existing in the state. As weathering continued and acidity developed, the supply of available plant nutrients diminished, so that the soil was no longer able to support a luxuriant vegetation and organic-matter destruction overtook accumulation, reducing the once dark brown surface color to brownish gray and gray. The soils on areas covered by timber became even lighter colored than those on the prairie because the growth of trees produced conditions which accelerated organic-matter destruction and the forest residue decayed too fast to add much organic matter to the soil to replace that lost by decomposition.

The loss of organic matter, together with the movement of the very fine clay particles out of the surface soil, results in a decline in soil productivity

because it is in these two materials that most of the available elements of plant food which are essential to vegetative growth are held in the soil. The prairie soils in western Clinton county had, before they were cultivated, moderate amounts of phosphorus, organic nitrogen, potassium, calcium, and magnesium in easily available form because they contained a moderate amount of organic matter and had not lost much of the very fine clay material from the surface soil. The soils in eastern Clinton county had only small quantities of the essential plant-food elements even before they were cultivated because their content of organic matter was low and they had lost most of the very fine clay material from the surface soil.

Another factor to be considered in the decline of soil productivity is the gradually decreasing rate at which the complex minerals break down and release the plant-food elements as the soil approaches maturity.

One of the most pronounced and universal effects of the weathering of soil material is the production of layers, or zones, in the soil, each zone having more or less definite characteristics. From a practical standpoint these various zones can be grouped into surface, subsurface, and subsoil. The subsoil often has two major divisions: the upper subsoil is the most compact and plastic zone in the soil; the lower subsoil is usually more friable than the upper. These layers, or zones, taken together constitute the "soil profile" (Fig. 5).

Differences in the arrangement, in the thickness, and in the nature of the features of the respective zones constitute the basis upon which soil types are differentiated and the soil map constructed.

THE SOIL MAP

Basis of Soil Classification

In the soil survey the "type" is the unit of classification. Each soil type has definite characteristics upon which its separation from other types is based. These characteristics are inherent in the strata, or horizons, which constitute the soil profile in all mature soils. Among them may be mentioned color, structure, texture, and chemical composition. Topography, as well as kind and character of vegetation, are easily observable features of the landscape which are very useful indicators of soil character. A knowledge of the geological origin and formation of the soil material of a region often makes possible an understanding of the soil conditions that exist.

Failure to appreciate the fact that soil types are differentiated on the basis of the character of the entire soil section, and not of the surface alone, often makes it difficult to understand what is meant by "soil type." It frequently happens that the surface stratum of one soil type is no different from that of another soil type, and yet the two types may be widely different in character as well as in agricultural value. It is of utmost importance in studying descriptions of soil types to get a clear mental picture of the outstanding features of each type.

Naming of Soil Types

To designate the soil types, the so-called "place-name" system is used. This system of nomenclature is employed almost universally. It is simple, convenient,

and has that essential merit of possibility for indefinite expansion. In this place-name system, the name of some geographical unit is arbitrarily assigned each type, this proper noun constituting the first word of the type name. Then to this word is appended one or more words descriptive of the surface-soil texture. Members of a given "soil series" all bear in common the same geographic term in their names but vary in descriptive terms according to the texture of the surface layer.

To assist in designating soil types, a number is assigned to each type. These numbers are not only a convenience in referring to the respective types but they are especially useful in designating very small areas on the map.

Table 1 gives the list of soil types as mapped in Clinton county, the area of each in square miles as well as in acres, and also the percentage that each type constitutes of the total area of the county. The accompanying soil map, shown in two sections, gives the location and boundary of each soil type and indicates the position of streams, roads, railroads, and towns.

DESCRIPTION OF SOIL TYPES

A brief description of the outstanding characteristics, together with some general recommendations on the use, care and management of each soil type as mapped in Clinton county are given in the following paragraphs. This information is summarized in Table 2.

The recommendations made for the utilization of soils is based on their capacity for efficient production as determined by the inherent characteristics of the soil. Such matters as the growing of special crops, the location of the land with respect to markets, and certain other economic considerations have not been taken into account.

To outline a complete soil-improvement and management program for a field or farm, one would need to know not only what soil types are involved, but also what cropping and management practices have been followed in the past, as well as what type of farming is intended to be followed in the future. Obviously, all of these details are not available. The purpose of this report, however, is to furnish the necessary information about soil types and to indicate the main factors that should be considered in developing a soil-treatment and management program for a given type. For example, the necessity of recognizing the soil type as a basis for working out a soil-improvement program may be illustrated by the fact that the drainage of upland soils developed on nearly level surfaces in Clinton county is so different from that of upland soils developed on rolling surfaces that the management program is altogether different in the two situations. In the improvement of the upland soils developed on nearly level topography, the first consideration is to remove the excess surface water which, because of an almost impervious subsoil, cannot be removed by underdrainage; while in the management of the upland soils developed on rolling surfaces the main problem is to retard the rate of surface run-off and to increase water absorption, thereby reducing erosion.

As an aid in determining differences in degree of acidity and the amount of some of the essential elements of plant food, certain relatively simple chemical

TABLE 1.—CLINTON COUNTY SOILS: AREAS OF THE DIFFERENT SOIL TYPES

Type No.	Type name	Area in square miles	Area in acres	Percent of total area
1	Rinard silt loam	2.80	1 792	.56
2	Cisne silt loam	91.83	58 771	18.49
3	Hoyleton silt loam	40.93	26 195	8.24
4	Walton silt loam	.84	538	.17
5	Eroded silt loam	.08	51	.01
8	Eroded gravelly loam	4.77	3 053	.96
11	Loy silt loam[1]			
12	Wynoose silt loam	12.69	8 122	2.55
13	Bluford silt loam	26.18	16 755	5.27
14	Ava silt loam	4.43	2 835	.89
32	DeSoto fine sandy loam[2]			
46	Edina silt loam	13.00	8 320	2.62
47	Shiloh silt loam	.11	70	.02
48	Ebbert silt loam	8.76	5 606	1.76
70	Beaucoup clay loam (terrace)	1.95	1 248	.39
72	Sharon silt loam (first bottom)	13.81	8 838	2.78
75	Drury fine sandy loam (terrace)	3.83	2 451	.77
84	Okaw silt loam (terrace)	.64	410	.12
108	Bonnie silt loam (first bottom)	103.90	66 496	20.92
109	Racoon silt loam (terrace)	5.84	3 738	1.17
110	Venedy silt loam (terrace)	10.75	6 880	2.16
111	Ora silt loam	1.12	717	.22
112	Putnam silt loam	79.51	50 886	16.01
113	Cox silt loam	20.98	13 427	4.22
127	Harrison silt loam	11.15	7 136	2.24
128	Douglas silt loam	.07	45	.01
143	Ava sandy loam	2.90	1 856	.58
164	Bluford silt loam (immature phase)	21.63	13 843	4.35
165	Wynoose silt loam (immature phase)	8.42	5 389	1.69
214	Ava silt loam (immature phase)	3.55	2 272	.71
	Water	.59	378	.12
	Total	497.06	318 118	100.00

[1]Occurs in very small areas, included with Type No. 12.
[2]Occurs in very small areas, included with Type No. 143.

tests for rapid examination of soils have been devised. It is recommended that these tests be made on fields where treatment to increase productivity is being planned. These tests are explained in the following publications of this Experiment Station:

Circular 346—"Test Your Soil for Acidity"
Circular 421—"Testing Soil for Available Phosphorus"
Mimeographed folder—"The Illinois Potash Test"

These publications, as well as others that may be mentioned later, may be obtained free of charge on request to the Agricultural Experiment Station, University of Illinois, Urbana, Illinois.

Table 2 presents a brief summary of the more important characteristics and properties of the Clinton county soil types, including topography, drainage, reaction with regard to acidity; contents of available phosphorus and of organic matter; workability; inherent productivity index; potential productivity level under good soil management as indicated by yields after soil treatment; and adaptation to production of different crops. The topography and drainage for the county in general have already been discussed. The table shows a large majority of the types to be acid and therefore in need of limestone. Most of them are also low in phosphorus as well as in organic matter.

TABLE 2.—CLINTON COUNTY SOILS: CHARACTERISTICS, PROPERTIES, AND ADAPT

Type No.	Type name	Topography	Drainage		Re-action	Available phosphorus	Organic matter	Workability
			Surface	Under				
1	Rinard silt loam	Nearly level	Slow	Slow	Acid	Low	Low	Fair
2	Cisne silt loam	Nearly level	Slow	Very slow	Acid	Low	Low	Fair
3	Hoyleton silt loam	Gently rolling	Moderate	Slow	Acid	Low	Low	Fair
4	Walton silt loam	Rolling	Rapid	Slow	Acid	Low	Low	Fair
5	Eroded silt loam	Steep	Rapid	Moderate	Acid	Low	Low	Poor
8	Eroded gravelly loam	Steep	Rapid	Rapid	Acid	Low	Low	Poor
12	Wynoose silt loam	Nearly level	Slow	Slow	Acid	Low	Low	Fair
13	Bluford silt loam	Gently rolling	Moderate	Slow	Acid	Low	Low	Fair
14	Ava silt loam	Rolling	Rapid	Moderate	Acid	Low	Low	Fair
46	Edina silt loam	Nearly level	Slow	Moderate	Acid	Moderately low	Medium	Good
47	Shiloh silt loam	Depressional	Slow	Moderate	Neutral	Moderately low	Medium	Fair
48	Ebbert silt loam	Nearly level	Slow	Slow	Acid	Low	Low	Fair
70	Beaucoup clay loam (terrace)	Nearly level	Slow	Slow	Neutral	Moderate	Low	Poor
72	Sharon loam (first bottom)	Nearly level	Moderate	Moderate	Acid	Low	Low	Fair
75	Drury fine sandy loam (terrace)	Nearly level	Moderate	Moderate	Neutral	Low	Low	Good
84	Okaw silt loam (terrace)	Nearly level	Slow	Very slow	Acid	Low	Low	Poor
108	Bonnie silt loam (first bottom)	Nearly level	Slow	Slow	Acid	Low	Low	Fair

TABLE 2.—*Concluded*

109	Racoon silt loam (terrace).....	Nearly level	Slow	Slow	Acid	Low	Low	Fair
110	Venedy silt loam (terrace).....	Nearly level	Slow	Moderate	Neutral	Moderately low	Low	Good
111	Ora silt loam.....	Nearly level	Slow	Slow	Acid	Low	Low	Fair
112	Putnam silt loam.....	Nearly level	Slow	Slow	Acid	Low	Low	Fair
113	Cox silt loam.....	Gently rolling	Moderate	Slow	Acid	Low	Low	Fair
127	Harrison silt loam.....	Gently rolling	Moderate	Moderate	Acid	Low	Medium	Good
128	Douglas silt loam.....	Rolling	Rapid	Moderate	Acid	Low	Low	Good
143	Ava sandy loam.....	Gently rolling	Rapid	Moderate	Acid	Low	Low	Good
164	Bluford silt loam (immature phase).....	Gently rolling	Moderate	Moderate	Acid	Low	Low	Good
165	Wynoose silt loam (immature phase).....	Nearly level	Slow	Slow	Acid	Low	Low	Fair
214	Ava silt loam (immature phase)..	Rolling	Rapid	Moderate	Acid	Low	Low	Good

[1]The index number assigned to a soil type refers to its *inherent* producing power; and the estimate of its inherent pr to produce the major crops grown in the region without soil treatment being applied but with the soil in a cleared an is 1 to 10, the most productive soil in the state being rated as 1 and the least productive as 10.

[2]This is roughly the productivity level following good soil management, compared with that of the better soils of

Attention should be called to the fact that these records are to be taken as general indications of conditions of the respective soil types, and they do not necessarily represent the true condition on every individual farm or field. As has already been pointed out, these may vary considerably with respect to acidity and fertility, and for that reason the tests as recommended in the discussions of the various soil types should be applied when soil treatment is contemplated.

Rinard silt loam (1)

Rinard silt loam occurs in shallow, basin-like depressions at the heads of drainage and on the nearly level uplands. It occupies 2.80 square miles and is found only in the northeastern part of the county. The surface material of this soil is mostly silt which has accumulated by sheet erosion from surrounding

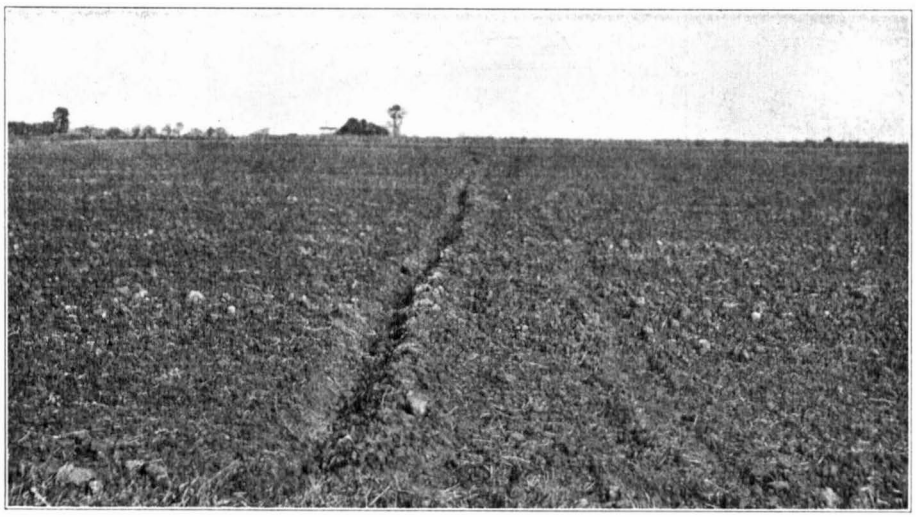

FIG. 6.—PROVIDING SURFACE DRAINAGE WHERE THE SUBSOIL IS TIGHT

Because of the very tight subsoil of Rinard silt loam and some other soil types in the Clinton county region, underdrainage is extremely difficult. Farmers must resort to various ways of providing surface drainage. Here a furrow has been plowed across a field planted to wheat in order to carry the water from the field.

higher land. The soil was developed under high moisture conditions and still drains very slowly because of the slow permeability of the subsoil and its topographic position.

The surface soil is a light brownish gray, friable silt loam about 6 to 8 inches in thickness. Small, hard, rounded, black pellets or concretions are abundant on the surface and are scattered thruout the profile. The thick subsurface layer is a light gray silt loam. The lower part is ashy-like and almost white. The subsoil begins at depths of 22 to 28 inches, depending on the amount of silt accumulated on the surface. The subsoil, which is pale yellowish gray, is a very compact and plastic clay in its upper part but more friable in the lower part. Small slick spots, or scalds, the characteristics of which are described under Type 2, Cisne silt loam, page 18, frequently occur in this type.

Rinard silt loam is strongly acid both in the surface and subsoil except in the above-mentioned slick spots whose subsoil usually has an alkaline reaction. The organic-matter and nitrogen content of the surface soil is low.

Use and Management.—Rinard silt loam produces moderate yields in seasons of well-distributed but not excessive rainfall. That partial or total crop failures are likely to be frequent should be kept in mind when the adoption of a soil-improvement program is being considered. If good furrow and open-ditch drainage can be provided, the next step is testing for lime requirement, as directed in

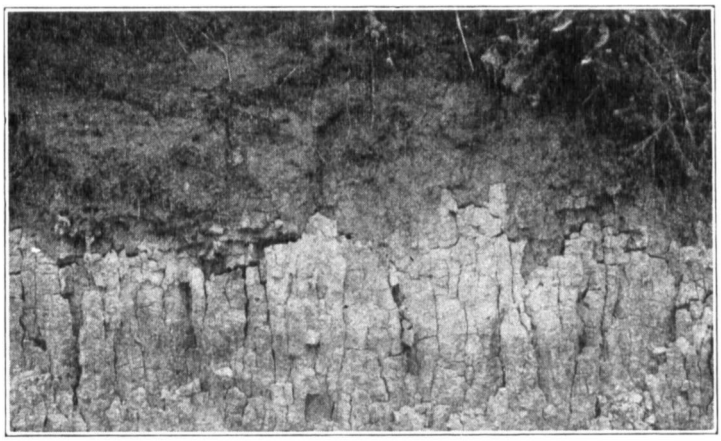

FIG. 7.—COLUMNAR STRUCTURE IN THE SUBSOIL OF A SLICK SPOT
This distinctly columnar formation occurs just beneath the surface horizons in slick-spot areas.

Illinois Circular 346. Following the application of limestone, sweet clover should be seeded, and this crop may be followed with corn for one year, after which a small grain and sweet clover should again be seeded. After sweet clover has been grown two or three times, probably the use of potash and possibly phosphate fertilizers will be advisable.

Cisne silt loam (2)

Cisne silt loam occurs on nearly level land in the central and eastern parts of the county. It is the prevailing upland soil type, covering altogether more than 90 square miles, or over 18 percent of the total area of the county. This type has developed under a prairie-grass vegetation and is characterized by an almost impervious subsoil. The soil drains very slowly and is often wet and cold in the spring. Slick spots frequently occur in conjunction with this soil type, and where they are so abundant as to occupy over 50 percent of the area, this condition is indicated on the soil map by crosshatch lines. This type is one of the most maturely developed soils in Clinton county and the amount of plant food available to crops each year is relatively small.

The surface soil is 5 to 7 inches thick and is a friable, light brownish gray silt loam. The upper part of the subsurface is light gray and the lower part almost white and ashy-like. Numerous small, hard, rounded, black pellets of

iron and manganese are present in the surface and subsurface. The subsoil begins at 18 to 22 inches and is a pale yellowish gray, very compact and plastic clay. Below 40 to 42 inches the subsoil is less compact and plastic and is yellowish in color. The material becomes somewhat sandy and gritty below 48 to 55 inches.

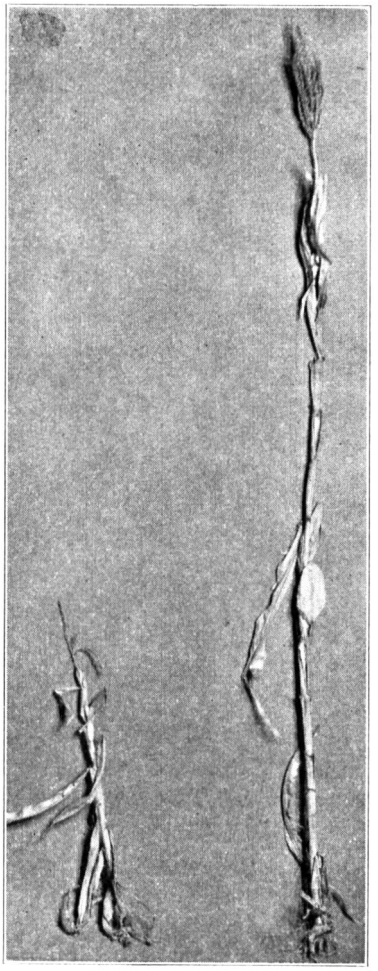

FIG. 8.—CORN ON SLICK SPOTS IS BADLY STUNTED

The small, runty stalk bearing no ear is characteristic of the growth on a slick spot. It came from the same field as the stalk at the right, which is representative of the normal corn crop on this particular field.

Slick Spots.—Slick spots, commonly known as scalds or alkali spots, can be recognized by their lighter colored surface soil, the pale yellowish or greenish gray color of their subsoil, and the poor plant growth or absence of plant growth on them. Rounded gray pellets or concretions of calcium carbonate about the size of a marble are present in places in the subsoil. The subsoil is very tough and is exposed on the surface in places where sheet erosion has been active. In many other places the surface soil is very thin. Underdrainage is extremely slow. When dry, slick spots are very hard, they resist the penetration of water, and when the land is being worked, they tend to throw the plow out of the ground. When thoroly soaked with water, they offer little resistance to pressure and form many of the bad mud holes in the roads.

The surface soil of slick spots is commonly acid but in correcting this condition a minimum amount of lime should be used, for the lower strata are likely to have a highly alkaline reaction.

Use and Management.—When drained by furrows and open ditches and well farmed but not given any kind of soil treatment, the producing capacity of Cisne silt loam is low. Under these conditions the average yield of corn cannot be expected to exceed about 15 bushels an acre and the yield of wheat about 6 bushels. With good surface drainage and with soil treatment that includes limestone in addition to legumes or manure, or that includes limestone, legumes, potash, and probably phosphate, the average yield of corn should be about 30 to 35 bushels and wheat 15 to 20 bushels an acre. There are reasons for thinking that the best use of this soil may perhaps be for meadow or pasture; but even when used for these purposes, the need for limestone should be recognized.

The improvement of this soil, which is low in organic matter and nitrogen,

strongly acid, and will not underdrain, should start with provision for adequate surface drainage and the use of sufficient limestone to grow sweet clover. The soil should be tested for degree of acidity, as suggested in Illinois Circular 346, and limestone applied in accordance with the results of the test. After the limestone-legume program has become established, it will be necessary to use a potash fertilizer unless manure is available.

The presence of slick spots adds to the difficulties in farming this soil. The spots vary in size, abundance, and harmfulness. It is suggested that where a slick spot is large enough to warrant separate treatment, enough limestone be applied to grow sweet clover, and that the sweet clover be allowed to reseed itself for a number of years before cultivation is attempted.

Hoyleton silt loam (3)

Hoyleton silt loam is scattered thruout the eastern part of the county on undulating land. The native vegetation was grass or scattering timber even tho the type occurs for the most part near the stream courses, where heavy timber would be expected. It occupies about 40 square miles, or slightly more than 8 percent of the total area of the county. This soil has fair surface drainage, but owing to an almost impervious subsoil, the underdrainage is poor. Slick spots occur in conjunction with this type, altho they are not so numerous nor so large as in Cisne silt loam.

The surface soil is a friable, brownish gray silt loam, 6 to 7 inches thick. The upper subsurface is yellowish gray and the lower ashy gray with orange-colored mottling. The subsoil, which begins at a depth of 15 to 18 inches, is an orange-mottled, pale yellowish gray, compact and plastic clay. Below 33 to 35 inches the subsoil becomes more friable and is brighter colored.

Use and Management.—The productivity of this soil when untreated is about the same as that of the soils occurring on the nearly level topography in this region, but because it is developed on slight slopes there is a possibility of treating it so that it will produce reasonably satisfactory yields.

When drainage has been provided, each field should be tested for its lime requirement, as suggested in Circular 346, and lime applied as the test indicates. Sweet clover grown and turned under, plus regular additions of animal manure, should build up the land so that an average of 20 to 25 bushels of wheat and 35 to 40 bushels of corn an acre a year can be expected, according to tests on the Ewing experiment field, a part of which is located on this same soil type. The results from those plots on the Ewing field that are on this type of soil indicate clearly that unless manure is available it is necessary sooner or later to fertilize with potash in addition to using limestone and legumes; however, potash need not be used until the limestone-legume program has become well established.

Walton silt loam (4)

Walton silt loam is found in the northern part of Clinton county on rolling knolls which stand out above the surrounding flat land. Altho this soil type is considered a grassland soil, most of these knolls were at one time covered with a growth of brush and scattering trees such as locust, elm, and wild cherry. The

soil has good surface drainage and fair underdrainage. The total area of this type in Clinton county amounts to less than a square mile.

The thin surface soil is a yellowish gray silt loam. The subsurface is yellow with dull red splotches. The subsoil, beginning at 11 to 13 inches, is a medium-compact, slightly plastic, reddish yellow clay loam becoming friable below 21 inches.

Use and Management.—In cultivating this soil precaution must be observed to prevent sheet erosion and gullying because of the rapid run-off of surface water. Cultivated land should be kept under a vegetation cover as much of the time as possible, particularly in winter and early spring, and all tillage should be on the contour. Because of its shallowness, this soil is not well adapted to terracing. The organic-matter content should be increased by plowing under animal manure or green manuring crops. The soil is acid and if legumes, such as sweet clover, are to be seeded, it should be tested for degree of acidity and limestone should be applied according to the indication of the test. An application of phosphorus, if a test indicates the need, would probably be advisable if wheat and legumes are grown. After proper treatment, including phosphate as well as limestone, this soil will grow alfalfa successfully and it is also adapted to small grains, orchard crops, small fruits, and vegetables. The yield of corn is often cut by summer drouths.

Eroded silt loam (5)

Only 51 acres in Clinton county are mapped as Eroded silt loam. Two small patches of this type are found on the steep gullied hillsides about a mile southeast of Carlyle, and a few others are mapped near the northern border of the county. There is little or no soil development, as the surface material washes away as fast as the weathering processes operate to form soil. The soil material is of a silty nature, having been deposited by the wind. This type is subject to destructive erosion.

Use and Management.—The less steep slopes of this soil can be used for orcharding and permanent pasture provided precautions are observed to keep them from eroding. The more rolling areas should be kept in timber or replanted to trees if the timber has been cut off. None of this land can be cultivated over a period of years without becoming seriously eroded.

Eroded gravelly loam (8)

Eroded gravelly loam occupies nearly 5 square miles, or about 1 percent of the total area of the county. It occurs along stream courses on the short, steep slopes between bottom and upland. The wind-blown silt that originally covered these slopes has been eroded away and the weathered, sandy, gravelly glacial drift forms the present soil material. Eroded gravelly loam shows no soil development because erosion removes the surface material faster than soil is developed.

Use and Management.—On account of erosion this type cannot be successfully cultivated. It is likely that with proper treatment some areas of this soil may be successfully used for pasture but in the main it should be kept in timber. Information about the planting and care of a wood lot and the harvesting of

its growth can be obtained by writing the Illinois Agricultural Experiment Station.

Loy silt loam (11)

Loy silt loam is a type found in very small patches in association with Wynoose silt loam. In fact the areas are so small that they are not shown on the map tho they may be easily recognized, as they occur only on the almost level-lying portions of Wynoose silt loam.

This type is developed on flat topography. The surface drainage, as well as the subsoil drainage, is poor. The surface soil, is a friable silt loam varying in color from gray to light brownish gray. The subsurface is a light gray, ashy, friable silt loam. The subsoil, which is encountered at about 20 inches, is a highly plastic, almost impervious tight clay of a yellowish slate-gray color mottled with pale yellow. The lower subsoil, which occurs below 34 inches, is a light yellowish gray, silty clay loam mottled with yellow.

Use and Management.—The difficulty of establishing drainage, the prevalence of slick spots, the low organic-matter content, and the high degree of acidity make a discouraging combination in considering any soil-improvement program for this soil type, and it is questionable how much expense should be incurred in attempting such a program. The soil gives fair response to limestone if sweet clover is grown and plowed under. The land can be kept in grass to serve as pasture, or it can be replanted to timber.

Wynoose silt loam (12)

Wynoose silt loam occurs on the nearly level, slowly drained upland that is now, or was formerly, covered by oak and hickory timber. It is found on the outer timber belt along the streams in the central and eastern parts of the county, and occupies a total area of about 12 square miles. It is characterized by an almost impervious subsoil. Small slick spots are commonly found in association with this type, and in many other respects it closely resembles Cisne silt loam, already described.

The surface soil is a friable, light brownish gray silt loam having a pale yellow cast and is 4 to 6 inches thick. The subsurface is pale yellowish gray in the upper part and light gray and ashy-like in the lower part. The subsoil, beginning at 17 to 21 inches, is a pale yellowish gray, very compact and plastic clay, becoming less compact below 40 to 42 inches. Sandy, gravelly material is present below 50 to 55 inches.

Use and Management.—The productivity of this soil when untreated is very low for grain crops. The untreated plots at the Raleigh experiment field, which is located on soil similar to this type, have averaged only about 4 bushels of wheat and less than 14 bushels of corn an acre a year.

The lack of sufficient slope to carry away surface water and the impervious nature of the clay pan subsoil make the drainage problem difficult. However, the fact that most areas of this type in Clinton county are within a short distance of an established drainage channel usually makes it possible to secure satisfactory surface drainage by means of open ditches and furrows. All attempts to tile this land have been unsuccessful because of the slowly pervious subsoil. Not

only does the subsoil impede the downward movement of moisture, but it also restricts the penetration of roots, thus causing shallow rooting.

Wynoose silt loam is low in organic matter and nitrogen and furthermore it is strongly acid. After drainage has been properly established, each field should be tested for its lime requirement, as explained in Circular 346. Experiment fields located on this soil type have proved lime to be the basic treatment for soil improvement. Satisfying the lime requirement will make it possible to grow and turn under sweet clover, and thus increase the organic-matter and nitrogen contents. Limestone and sweet clover have increased the yields on the Raleigh soil experiment field to an average of about 12 bushels of wheat, 22 bushels of oats, and 35 bushels of corn an acre a year.

The use of mineral fertilizers, phosphorus, and potassium, in addition to legumes and lime, has raised the yield of wheat, as an average of 10 crops, to 18 bushels an acre, while the yield of 12 consecutive crops of corn has been raised to 47 bushels an acre a year.

Bluford silt loam (13)

Bluford silt loam is found along the stream courses in the central and eastern parts of Clinton county. It occurs on gently rolling topography and is now, or was formerly, covered by timber. It occupies a total area of about 25 square miles. It has moderately rapid surface drainage but due to a compact subsoil underdrainage is relatively slow. Sheet erosion on the more rolling slopes in cultivated fields is a serious problem, and there are many places where small gullies have already become established.

The surface soil is a friable, brownish gray silt loam. It is 6 to 7 inches in thickness except where sheet erosion has removed some of the material. The subsurface is yellow in the upper part and pale yellow to almost gray in the lower part. The subsoil, beginning at 14 to 17 inches, is a medium-compact and plastic grayish yellow clay. A narrow band of gray colored, less compact material is frequently present at 20 to 24 inches. Below 40 to 44 inches the material becomes less compact, and sand and grit appears at 50 to 55 inches.

Use and Management.—An efficient soil-management program for Bluford silt loam must take into consideration the improvement of drainage and the checking of sheet erosion. The application of limestone and fertilizers as needed will make possible the vigorous growth of vegetation including legumes (Fig. 9). This soil has good surface drainage but underdrainage is slow because of the slowly pervious subsoil. This characteristic makes it necessary to remove surplus water by means of furrows and open ditches.

Sheet erosion is very harmful on this soil. It may be largely controlled by the use of vegetation as above indicated. This measure should be supplemented by practicing contour tillage and, in some places, by constructing diversion ditches and terraces.

This soil, while relatively unproductive when untreated and farmed in the way common to the region, responds well to good treatment and management. It should be tested for degree of acidity, as explained in Circular 346, and then limestone applied as indicated by the test. With sufficient limestone a thrifty growth of sweet clover should be obtained. On the Ewing experiment field, on

plots where the soil responds in a manner similar to Bluford silt loam, the limestone-legume treatment in a long-time test has raised the annual acre-yield of corn from 13 bushels to 27 bushels and of wheat from 4 bushels to 21 bushels.

FIG. 9.—ALFALFA ON BLUFORD SILT LOAM

This thrifty field of alfalfa growing on a Clinton county farm suggests the desirability of raising more of this valuable crop where the soil is adapted to its culture.

Additional treatment with phosphorus and potassium has brought the yield of corn to 48 bushels and wheat to 28 bushels an acre.

Ava silt loam (14)

Ava silt loam is found on the knolls and low ridges of glacial origin which are scattered thru the central part of the county. It occupies a total of about 4½ square miles. This soil is characterized by an open, reddish yellow subsoil. It has excellent surface drainage and good underdrainage but is subject to severe erosion when cultivated. It was originally covered with forest vegetation, most of which has been cleared off for farming.

The surface soil is a friable, brownish yellow silt loam, varying from 4 to 6 inches in thickness, depending on the amount of material removed from the surface by sheet erosion. The subsurface is friable and yellow in color. The subsoil begins at 8 to 13 inches below the surface. Its upper part is a reddish yellow, slightly compact, nonplastic, silty clay loam which upon rupture breaks into large granules. The lower subsoil, beginning at 22 to 28 inches, is more compact than the upper, and the particles have a thin, gray coating. Below 38 to 42 inches the material becomes friable and loose.

Use and Management.—When Ava silt loam is used for farming, the first provision to be made in its management is to protect it from erosion. Terraces can be built, as suggested in Circular 290, to check the run-off, with all farming operations to be done on the contour, but to be effective soil treatment must be practiced at the same time in order to make vigorous plant growth possible. Turning under animal manures and green manuring crops will lessen the tendency to erode.

This soil is medium to strongly acid both in the surface and subsoil. If red

clover or sweet clover is to be grown, each field should be tested for acidity, as explained in Circular 346, and limestone applied as the test indicates. These legumes, especially sweet clover, are good green-manuring crops to use in building up the producing capacity of this soil. The addition of a phosphate fertilizer will probably give a good return, particularly if legumes or wheat are grown.

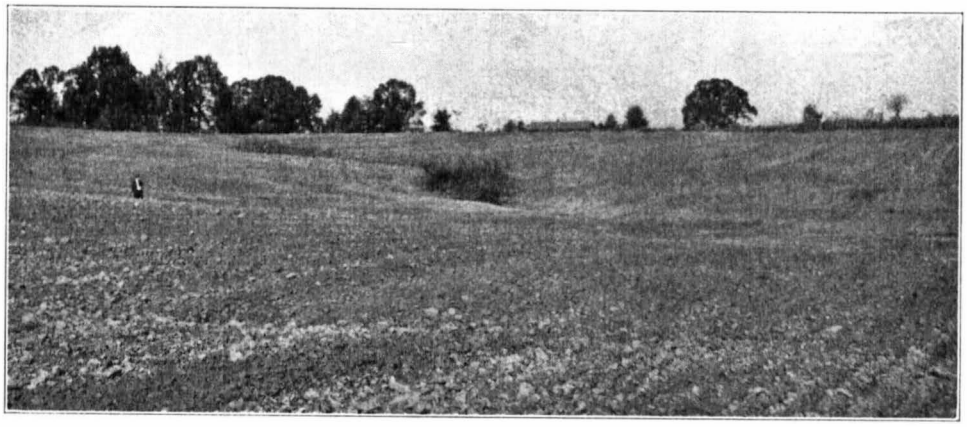

FIG. 10.—LAND SUCH AS THIS SHOULD NOT BE LEFT LONG WITHOUT A PROTECTING CROP

It would be well if this field, which formerly grew alfalfa successfully, were soon restored to that crop or a similar one. With its 7-percent slope, the field is subject to serious erosion, as is evident in this picture.

It would be advisable, however, to test for available phosphorus as explained in Circular 421 of this Station, "Testing Soil for Available Phosphorus," before applying this material. Alfalfa will do well on this soil following liming and phosphating, altho exceptionally dry summers are likely to cut the yields somewhat.

On this soil winter grains and grass crops should predominate in the crop rotation. Corn will yield satisfactorily except in dry summers, but corn should not be grown more than once in four years. This soil is well adapted to vegetable, small-fruit, and orchard crops because it dries out early in spring and has good air drainage.

DeSoto fine sandy loam (32)

Very small areas of a type designated as DeSoto fine sandy loam occur on the upland bordering Kaskaskia river, and while they are not shown on the map they may be recognized from the following description:

DeSoto fine sandy loam is closely associated with Ava sandy loam but the latter was developed on a flat topography under poor drainage conditions, while the former type was developed on rolling topography under excellent drainage conditions. The surface soil is a light yellowish gray fine sandy loam. The subsurface is a light gray, friable, sandy silt loam. The upper subsoil, beginning at about 19 inches, is a light gray, yellow mottled, compact, medium-plastic clay. The lower subsoil, which occurs at about 29 inches, is a light yellowish gray, yellow-mottled, compact, plastic, semitight clay. Below 36 inches the material

is a light gray, friable, fine sandy silt loam heavily splotched with deep yellow to brownish black iron accumulations. This soil is similar to Type 12 in color and topography but has a higher agricultural value because of having a somewhat more pervious subsoil and a thin covering of recent wind-blown material on the surface. It is low in available nitrogen and organic matter. In reaction it is medium-acid, requiring an application of limestone before sweet clover can be grown.

Edina silt loam (46)

Edina silt loam is a dark-colored soil that occurs on nearly level land in the western part of Clinton county. It occupies a total of 13 square miles. It was originally poorly drained, but almost all areas have been artificially drained by tile since they have come under cultivation.

The surface soil is dark brown when moist, but has a grayish cast when dry. It is about 8 inches thick, friable, and cultivates easily. The upper subsurface is darker colored and slightly heavier in texture than the surface. There is a thin, silty, brownish gray layer at the base of this zone. The subsoil, beginning at 16 to 18 inches, is a drabbish yellow, moderately compact and plastic clay. The subsoil becomes friable below 32 to 36 inches and is grayish yellow in color. Concretions of lime are present in the subsoil in some places and occasionally they are found on the surface.

Edina silt loam varies from slightly acid to medium acid in the surface and from sweet to slightly acid in the subsoil. The available phosphorus and potassium vary within the limits of low to medium. Organic matter is present in moderate amounts, but the nitrogen content of the cultivated soil is low.

Use and Management.—Corn and wheat in a rotation with clover have been the principal crops grown on this soil. During the first years of cultivation, yields were high but they are no longer satisfactory on untreated land. Red clover fails to make a good stand in all but the favorable years.

Treatment to keep up the productivity of this soil consists of regular additions of organic matter, either by liberal applications of manure or thru the growing and plowing under of legumes, at least once in the rotation. If legumes are to be grown, the soil should be tested for acidity, as explained in Circular 346, and limestone applied as indicated by the test.

Edina silt loam should return satisfactory crop yields when properly treated. If it does not, then in all probability better drainage should be provided. Tile should be placed not more than 4 rods apart, and a good outlet must be obtained if the excess water is to be carried away promptly.

Results from the Lebanon experiment field which is located on this soil type are of interest. Here the untreated soil has given a long-time average of 21 bushels of wheat per acre, 26 bushels of corn, and 32 bushels of oats. The limestone-legume treatment has brought these yields up to an average 28 bushels of wheat, 48 bushels of corn, and 48 bushels of oats. Phosphorus and potassium fertilizers along with the lime-legume treatment have advanced the yields still further—to 30 bushels of wheat, 54 bushels of corn, and 50 bushels of oats per acre. It appears from the records of these plots that the potassium in this combination has had little or no effect on the wheat yields, and that the phosphorus has been of no benefit to the corn.

Shiloh silt loam (47)

Shiloh silt loam is a very minor type, only one tract of 70 acres being mapped in the county. It is located about 1½ miles north of Trenton in a shallow basin-like area that was originally swampy. The soil is similar to the preceding type, Edina silt loam, differing from it chiefly in being more poorly drained naturally and in having a darker colored surface and subsurface soil.

Use and Management.—The same recommendations suggested for the management of Edina silt loam (46) apply to this type. Particular attention, however, must be given to draining this soil, as water stands on the surface for several days after heavy rains. Large tile or an open ditch with sufficient fall leading into a good outlet should be effective in removing the excess water before it damages growing crops. Frequent additions of fresh organic matter are necessary to maintain a favorable physical condition. When properly managed, including drainage, this soil should return very satisfactory yields of the grain crops commonly grown in the region.

Ebbert silt loam (48)

Ebbert silt loam is found in shallow depressions in the uplands that were formerly somewhat swampy. It covers nearly 9 square miles in Clinton county. The largest area occurs in the eastern part of the county just west of Ferrin. This soil is naturally poorly drained but drainage can be improved by artificial means. Numerous slick spots occur in association with this soil.

The surface soil is a friable, grayish drab silt loam, varying from 7 to 10 inches in thickness. The subsurface is a light drabbish gray, yellow-spotted, friable silt loam. The subsoil, beginning at 18 to 24 inches, is a medium-compact and plastic silty clay loam, gray in color, spotted with yellow. Below 38 to 40 inches the material becomes more friable and is pale yellowish in color.

Use and Management.—This soil can be made moderately productive by proper treatment. Drainage must be provided, first by establishing an outlet for the water and then thoroly surface-ditching the area. Tile can be used, but because of the compact nature of the subsoil they will not draw water very far, and to be effective they must be placed not more than 4 rods apart. The soil is sour but does not need so much lime to grow sweet clover as do most soils in the county. It is suggested that each field be tested for acidity as explained in Circular 346. After the soil has been limed, sweet clover should be grown and turned under. Further treatments, other than adding all available animal manure, should be on a trial basis. This soil when treated is adapted to the growing of the grain crops common to the region. Corn yields on slick spots are unsatisfactory. In fields where slick spots predominate, corn should probably be excluded from the rotation.

Beaucoup clay loam (terrace) (70)

Beaucoup clay loam (terrace) is a second bottom-land soil occurring along Kaskaskia river in the southern part of the county in association with Venedy silt loam. It has been formed from sediment deposited from standing water, and most of the areas of this type have remained poorly drained and swampy. It is subject to overflow during floods. The type occupies about 2 square miles.

The surface soil is a sticky, tough, drab clay loam 4 to 8 inches thick. There is no true subsurface and subsoil development, the color of the material beneath the surface gradually becoming grayish drab and below 18 to 25 inches gray. The tough, plastic nature of the material continues to depths of several feet.

Use and Management.—The chief problem in the management of this soil type is to obtain adequate drainage. Overflow water must be kept out if possible, and provision must be made for the accumulation of water from rain to be removed quickly. If adequate drainage can be provided, the organic-matter and nitrogen contents should be increased and maintained by plowing down regular applications of manure of some kind. Sweet clover is probably the best green-manure crop to use on this soil. It will grow on most areas of this type without lime, altho testing for acidity is suggested. The growing and turning under of sweet clover will improve the physical condition of the soil, thereby making it easier to cultivate.

Sharon silt loam (first bottom) (72)

Sharon silt loam (first bottom) is found thruout the county in the bottom lands of small streams. It is subject to frequent overflow following heavy rains, and almost every overflow brings a deposit of new material. The soil is therefore young and has little or no profile development. It is a mixture of sand, silt, and clay. About 14 square miles of this type have been mapped in Clinton county.

Use and Management.—In view of the frequent overflow, no treatment is suggested, since new material is constantly being brought in and deposited. This addition of new soil material serves to keep up the productive level. Unless the land can be protected from overflow, corn, soybeans and other short-season summer crops should be grown.

Drury fine sandy loam (terrace) (75)

Drury fine sandy loam (terrace) is a type found around the base of some of the higher ridges in the upland and at the foot of certain bluffs in the bottom lands. It is derived from the accumulation of sediment carried by run-off water. It has little or no soil development because the sediment is still accumulating. Nearly 4 square miles in Clinton county are covered by this type. This soil in the upland is subject to overflow from adjacent higher land and that in the bottom suffers from the highest floods, but in either location there is sufficient slope to permit the water to drain away quickly.

The surface soil is a yellowish gray to yellow, friable, fine sandy to silty material. This gradually merges into a silty substratum which is lighter in color than the surface, and which varies from one to several feet in thickness.

Use and Management.—This soil is well drained and is, in general, moderately productive. Because it is so variable, specific recommendations for management cannot well be given. It is suggested that each area be tested for acidity, and that the management be based on the results of these tests.

Okaw silt loam (terrace) (84)

Okaw silt loam (terrace) occurs along Kaskaskia river in the southwest part of the county. The type has been formed by the deposition of a silty layer over

a heavy clay. It is subject to overflow during flood time and drains very slowly. About 28 square miles are included in this type.

The surface soil is a pale yellowish gray silt loam 2 to 4 inches thick. The subsurface is an ashy gray silt loam varying from 2 to 18 inches in thickness. The subsoil is a heavy, plastic, pale yellowish gray clay varying from 5 to 12 feet or more in thickness.

Use and Management.—The value of this soil for farming is very low because of the impossibility of securing adequate drainage. It is doubtful whether any efforts should be made to improve this land as there is no indication that they would prove successful. The areas should be devoted to the growing of timber or they may serve as pasture or meadow.

Bonnie silt loam (first bottom) (108)

Bonnie silt loam (first bottom) constitutes the most extensive single soil type in Clinton county, occupying about 104 square miles, or over 20 percent of the total area. It is found in the large bottom lands along the major streams. These

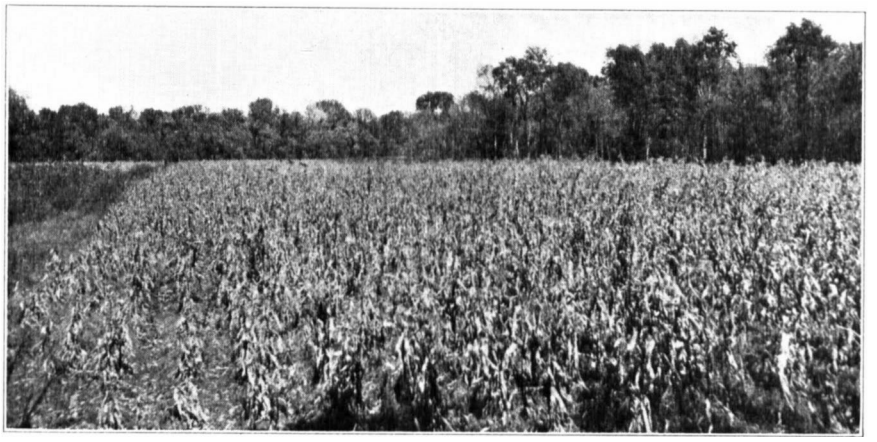

FIG. 11.—A CHARACTERISTIC SCENE ON BONNIE SILT LOAM

Fields of corn on this bottom-land soil are often surrounded with unplowed patches of weeds and areas of timber. This picture was taken late in October, when the corn was mature. See also Fig. 4, page 7.

bottom lands are nearly level. They flood frequently, drain out slowly, and are often swampy. Numerous small lakes are scattered thruout the area of this type in the Kaskaskia river bottom. The material which forms this soil is largely silt brought down from upstream and surrounding uplands. The soil is youthful because it is continually receiving new deposits from the overflow waters. It is estimated that somewhat less than half of the area of this type is cultivated each year. Most of the Kaskaskia bottom north of Carlyle has never been cleared of timber.

The surface soil is a friable, dark gray silt loam, varying from 6 to 10 inches in thickness. In some places sand and a few small pebbles are mixed with the silty material. Numerous small, hard round pellets of iron and manganese are

frequently found scattered thruout the soil. The material becomes lighter in color below the surface and is silty to a considerable depth but there is no true subsoil developed.

Use and Management.—Except in areas protected by a levee, frequent overflows and slow drainage limit the use of this soil type to pasture and timber. Unless the soil can be adequately drained it probably is best to leave it in timber, or if already cleared, to replant it with trees. Where a good outlet can be obtained and there is sufficient slope for water to flow, surface ditches will drain this soil so that corn, cowpeas, soybeans, and other short-season crops can be successfully grown (Fig. 11). The average loss of a summer crop by flooding is about one out of five. If drainage can be made adequate enough to justify soil improvement, the land should be tested for acidity, as explained in Circular 346, and limestone applied according to the test. Sweet clover or some other legume can then be grown and plowed under in order to increase the organic-matter and nitrogen contents.

Racoon silt loam (terrace) (109)

Racoon silt loam (terrace) is found closely associated with Bonnie silt loam (first bottom) along Kaskaskia river in the southwestern part of the county. This soil is differentiated from Bonnie silt loam (first bottom) by having a fairly well-developed subsoil and also by occurring on slightly higher land. Altho this land is subject to overflow, the water seldom covers it for any length of time. Drainage is slow on account of the compact subsoil. This soil type covers altogether nearly 6 square miles.

The surface soil is a friable, dark gray silt loam, varying from 7 to 10 inches in thickness. The subsurface is light gray in color with a tendency to be ashy in the lower part. The subsoil begins at 22 to 28 inches and is a pale yellowish gray, compact, and plastic clay loam. The subsoil has not developed to a uniform thickness in the type as a whole. It varies from a few inches to as much as 18 inches in thickness. The material becomes light gray and friable below the subsoil, except in the lower-lying areas, where it is a heavy, plastic clay loam.

Use and Management.—The success to be obtained in the cultivation of Racoon silt loam (terrace) is dependent largely on maintaining proper drainage. A thoro system of open surface ditching leading into a well-established outlet will remove the excess water in most seasons early enough for spring planting. Where adequate drainage is provided, the recommendations made for increasing the organic-matter and nitrogen contents of Bonnie silt loam (first bottom), page 28, apply also to this type.

Venedy silt loam (terrace) (110)

Venedy silt loam (terrace) is the most productive terrace soil in Clinton county. Most of the area of this type lies to the south and east of Bartelso. Altogether there are nearly 11 square miles of it in the county. This land is subject to overflow during flood times as it lies but slightly higher than the adjacent bottom, but fortunately the water does not stand on the soil for long periods. Natural drainage is slow because of the lack of an outlet for the water, but the soil can be satisfactorily drained if an outlet is established. Several square miles of this type lying south of Bartelso are protected from flooding by a levee.

The surface soil is a friable, drabbish brown silt loam 7 to 9 inches in thickness. It has a grayish cast when dry. The subsurface is yellowish drab in color and slightly heavier in texture than the surface. In a few places the lower subsurface is grayish yellow and silty in texture. The subsoil, beginning at 15 to 20 inches, is a drabbish yellow, slightly compact, medium-plastic clay loam. Concretions of calcium carbonate are frequently found in the subsoil.

Use and Management.—Where adequate drainage has been provided, either by open surface ditches or by tile, this soil returns moderately good crop yields without soil treatment. It will be found to vary in acidity from slight to medium and will not need as much limestone to grow clovers as do most soils in this county. The growing and turning under of legume crops, or the frequent addition of animal manure, will increase the organic-matter and nitrogen contents of the soil.

Ora silt loam (111)

Ora silt loam is an upland soil type found on the nearly level to slightly depressional areas in the western part of the county, the largest area being 2 miles west of Germantown. Altogether a little more than 1 square mile is included in this type. The soil has developed under very slow drainage, but the original, more-or-less swampy conditions have been improved thru artificial drainage. This soil resembles the Rinard silt loam described on page 16, but differs from it in having a darker surface, a somewhat less compact and plastic subsoil, and also in being naturally more productive.

The surface soil is a friable, brownish gray silt loam. The subsurface is light brownish gray in color and the lower part is ashy. The subsoil, beginning at 24 to 30 inches, is a compact and plastic clay of a gray color mottled with pale yellow. Considerable silting-in from surrounding higher land has resulted in giving this soil a thick surface.

Use and Management.—Adequate drainage must be provided, either by the use of open surface ditches or by tile. If tile are used, they must be placed close together and shallow. Often a good outlet for tile cannot be obtained, in which case open surface ditching is the only means of draining the land. The soil is low in organic matter and nitrogen, and fresh organic material should be added regularly in the form of animal manure or green-manuring crops. The soil is acid and low in available phosphorus. It should be tested, and limestone and phosphate applied as the tests indicate. If corn is to be grown, trial applications of a potassium fertilizer are suggested, particularly if no animal manure is available.

Putnam silt loam (112)

From the standpoint of its extent, Putnam silt loam is one of the major soil types of Clinton county, covering all told about 80 square miles. This soil occupies the nearly level, slowly drained prairie land in the western part of the county. It is characterized by an impervious subsoil which makes underdrainage very slow. It resembles the Cisne silt loam described on page 17 but has a darker surface soil, a less gray subsoil, and is naturally somewhat more productive. In the area between Carlyle and Breese, slick spots are very common.

The surface soil is a friable, grayish brown silt loam, 6 to 7 inches thick.

The upper subsurface is brownish gray and the lower subsurface gray and in some places ashy. Hard, rounded, black pellets of iron and manganese are present in both the surface and subsurface strata. The subsoil, which begins at 17 to 21 inches, is a very compact and plastic clay of a grayish yellow color splotched with reddish brown. Below 34 to 36 inches it is less compact and is a pale yellowish color.

Use and Management.—The recommendations made for the improvement of Cisne silt loam, pages 18 and 19, apply in general to this type. Better response should be obtained in treating this type than the former, altho only moderate yields on the average can be expected even under the best of treatment because of the slow drainage handicap and the prevalence of so many unproductive slick spots. Corn is not recommended as a frequent crop in the rotation but when it is used a trial application of a potassium fertilizer is suggested. Alfalfa does not grow successfully on this type, but after proper soil treatment, some of the other legumes, such as sweet clover, soybeans, and lespedeza, do well. Putnam silt loam is primarily a wheat soil, and when well farmed under good surface drainage, produces satisfactory yields of this crop.

Cox silt loam (113)

Cox silt loam is mapped on the gently sloping prairie land bordering the stream courses in the west-central part of the county. The type covers altogether about 21 square miles. The surface drainage is moderately rapid but underdrainage is slow. This soil resembles Hoyleton silt loam, described on page 19, but differs from it in having more organic matter in the surface stratum, in having a somewhat less compact and a brighter colored subsoil, and in being more productive.

The surface soil is a friable, brownish gray silt loam, 5 to 7 inches thick. The subsurface is yellowish gray, the lower part of which is ashy and splotched with orange or dull red. The subsoil is a compact, plastic, drabbish yellow clay often splotched with dull red. Below 30 to 32 inches the material becomes more friable. Slick spots occur in association with this soil and in some areas materially lower its agricultural value.

Use and Management.—Drainage should be provided by means of a system of surface ditching that will quickly remove the excess surface water with as little erosion as possible. The organic-matter content must be built up and maintained by frequent additions of manure or the growing of clover. The soil should be tested for its need of limestone and available phosphorus, and limestone and phosphate applied according to the indications of the tests. Following the increase in organic matter, trial applications of a potassium fertilizer should be made. This soil will return moderate yields if properly managed, but it will not produce satisfactorily under poor farming.

Harrison silt loam (127)

Harrison silt loam is a dark-colored soil found on gently sloping prairie land in the western part of Clinton county. It has moderately rapid drainage. There are about 11 square miles of this soil in the county.

The surface soil is a grayish brown, friable silt loam 7 to 9 inches thick. The subsurface is yellowish brown with a distinctly gray cast, the lower 2 or 3 inches of which is often gray and somewhat ashy. The subsoil begins at about 18 inches and is a moderately compact, slightly plastic, brownish yellow clay loam. The lower subsoil below 26 to 28 inches becomes more friable.

Use and Management.—Harrison silt loam is one of the most productive soils in Clinton county. When adequate drainage has been established, attention should be given to providing a continuous supply of fresh organic matter. The soil should be tested for its need of limestone and available phosphorus and these materials applied where needed. The soil will respond well to a limestone–sweet-clover treatment and is adapted to the growing of alfalfa and other farm crops common to the region. Under good management this soil should produce good yields consistently.

Douglas silt loam (128)

Douglas silt loam occurs in small spots on the rolling, rapidly drained prairie areas in the western part of Clinton county. It is the least extensive of the recognized soil types in the county, covering, all told, only 45 acres.

The surface soil is a thin, light brown silt loam with a gray cast. The subsurface is friable, and yellow in color. The subsoil begins at 9 to 13 inches and is a reddish yellow, slightly compacted, silty clay loam. Below 21 to 24 inches the material becomes friable and silty and is bright yellow in color.

Use and Management.—Practically the same treatment is recommended for this type as was suggested for the preceding type, Harrison silt loam. More attention, however, must be given to maintaining the organic-matter and nitrogen contents in this soil than in Harrison silt loam. Vegetation should also be kept on the land as much of the time as possible, as the soil is subject to sheet erosion during heavy rains. Corn yields are frequently reduced on this soil type by summer drouths. Legumes and small grain, together with orchard crops and small fruits, are adapted to this land.

Ava sandy loam (143)

Ava sandy loam occurs on the undulating ridges in the Kaskaskia river bottom. This type stands above most overflow water, altho it is covered by the highest floods. Flood water never remains on it for very long periods. Owing to its favorable topography this soil is well drained. Almost 3 square miles of this type are included in Clinton county.

The surface soil varies from 3 to 7 inches in thickness and is a reddish yellow sandy loam with a brownish cast. In some places there is considerable silt mixed with the sand. The subsurface is similar to the surface but is somewhat lighter in color and more sandy. The subsoil begins at 11 to 15 inches and is a reddish yellow, sandy silt loam, medium-compact and nonplastic.

Use and Management.—This soil is low in organic matter and nitrogen besides being medium to strongly acid. Following the correction of acidity, it will grow good legume crops and small grains. Corn does fairly well provided the organic-matter and nitrogen deficiencies are corrected.

Wynoose silt loam (immature phase) (165)

Wynoose silt loam (immature phase) differs from the mature phase (Type 12) in having a darker colored surface soil, in being more easily drained, and in being naturally more productive. It occurs in the western part of Clinton county on nearly level topography which is now or was formerly covered by timber. Both the surface soil and subsoil drain slowly. This type covers about 8½ square miles in the county.

The surface soil is a thin, brownish yellow-gray, friable silt loam. The upper subsurface is pale yellowish gray and the lower subsurface is light gray in color and is ashy. The subsoil, beginning at 18 to 20 inches, is a pale yellow, compact and plastic clay. It becomes more friable below 34 to 36 inches and is brighter yellow in color.

Use and Management.—The recommendations given for the mature phase of Wynoose silt loam, pages 21 and 22, apply also to this soil. This immature phase, however, can be adequately drained and will return moderate crop yields under good management.

Ava silt loam (immature phase) (214)

Ava silt loam (immature phase) occurs on the rolling, rapidly drained glacial knolls and ridges which stand out prominently in the central and western parts of Clinton county. It differs from Ava silt loam (mature phase), Type 14, chiefly in having a thicker surface soil and a more open subsoil and in being less acid and more productive. This type occupies about 3½ square miles.

The surface soil is a very friable, brownish yellow silt loam varying from 5 to 7 inches in thickness. The subsurface is friable and reddish yellow. The subsoil, beginning at a depth of 10 to 15 inches, is a reddish yellow, slightly compacted, nonplastic, silty clay loam; below 24 to 26 inches it becomes very friable and is yellow in color.

Use and Management.—In general the management and use suggested for Ava silt loam (mature phase), pages 23 and 24, apply to this immature phase. The water-absorbing power of this soil is higher than that of the mature phase of the type, probably in part because of its higher organic-matter content. The most serious problem in the use of this land for general farming is erosion. This fact should be recognized and every effort made to reduce erosion; otherwise, rapid soil destruction is inevitable.

Bluford silt loam (immature phase) (164)

Bluford silt loam (immature phase) occurs on sloping land which is now or was formerly timbered. It has moderately rapid surface drainage but underdrainage is rather slow. It borders the stream courses in the western part of Clinton county, occupying a total of over 21 square miles. It is naturally more productive than the mature phase of the type (Type 13) since it is not so far along in development.

The surface soil, which is 6 to 7 inches thick, is a brownish yellow-gray friable silt loam. The upper subsurface is yellow; the lower subsurface pale yellow and somewhat ashy. The upper subsoil, which begins at 14 to 17 inches, is a drabbish-yellow, medium-compact, medium-plastic clay loam. The lower subsoil below 28 to 30 inches becomes more friable.

Use and Management.—The management recommendations for the mature phase (Type 13, page 22) apply also to this immature phase. Under similar management this soil will outyield the former type.

Soil Reports Published

1 Clay, 1911
2 Moultrie, 1911
3 Hardin, 1912
4 Sangamon, 1912
5 LaSalle, 1913
6 Knox, 1913
7 McDonough, 1913
8 Bond, 1913
9 Lake, 1915
10 McLean, 1915
11 Pike, 1915
12 Winnebago, 1916
13 Kankakee, 1916
14 Tazewell, 1916
15 Edgar, 1917
16 DuPage, 1917
17 Kane, 1917
18 Champaign, 1918
19 Peoria, 1921
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EAST SHEET

LEGEND

1	Rinard silt loam	72	Sharon silt loam (first bottom)
2	Cisne silt loam	75	Drury fine sandy loam (terrace)
3	Hoyleton silt loam	84	Okaw silt loam (terrace)
4	Walton silt loam	108	Bonnie silt loam (first bottom)
5	Eroded Silt Loam	109	Racoon silt loam (terrace)
8	Eroded Gravelly Loam	110	Venedy silt loam (terrace)
11	Loy silt loam	111	Ora silt loam
12	Wynoose silt loam	112	Putnam silt loam
13	Bluford silt loam	113	Cox silt loam
14	Ava silt loam	127	Harrison silt loam
32	De Soto fine sandy loam	128	Douglas silt loam
46	Edina silt loam	143	Ava sandy loam
47	Shiloh silt loam	164	Bluford silt loam (immature phase)
48	Ebbert silt loam	165	Wynoose silt loam (immature phase)
70	Beaucoup clay loam (terrace)	214	Ava silt loam (immature phase)

Slick spots occupy over 50 per cent of area

CONVENTIONAL SIGNS

- Public roads
- Paved roads
- Private roads
- Railroads (steam)
- Township boundary lines
- County boundary lines
- Levee
- Streams (flowing)
- Streams (intermittent)
- Lakes or ponds
- Swamps
- △△△△ Small areas limestone outcrop
- □□□□ Small areas sandstone outcrop
- O M.D. Mine dump

BOND COUNTY · R. 3 W. · R. 2 W. · FAYETTE COUNTY · R. 1 W. · MARION COUNTY

T. 3 N. · T. 2 N. · T. 1 N.

Keyesport · Horseshoe Lake · Watson Lake · Sycamore Lake · Green Lake · Crosskey Lake · Boulder · Coles Lake · McMillan Lake · Clear Lake · Club Lake · Huey · Ferrin · Shattuc · Beckemeyer · CARLYLE · Bartelso · Blank Lake · Townsend Lake · Swan Lake · Cow Lake · Long Lake · Hoffman · Posey · Centralia · Beaver Creek · Crooked Creek · Muddy Creek · Lost Creek · Shoal Creek · Route 127 · Route 50 · Route 127 · Route 12 · Route 12 · CHICAGO · BURLINGTON · BALTIMORE · SOUTHERN · OHIO · RAILROAD · RAILROAD · KASKASKIA · WASHINGTON · CLINTON COUNTY

Scale 0 ¼ ½ 1 2 Miles

1930

LITHO EASTERN OFFSET INC., BALTO

SOIL SURVEY MAP OF CLINTON COUNTY

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

WEST SHEET

CONVENTIONAL SIGNS

- Public roads
- Paved roads
- Private roads
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- Township boundary lines
- County boundary lines
- Levee
- Streams (flowing)
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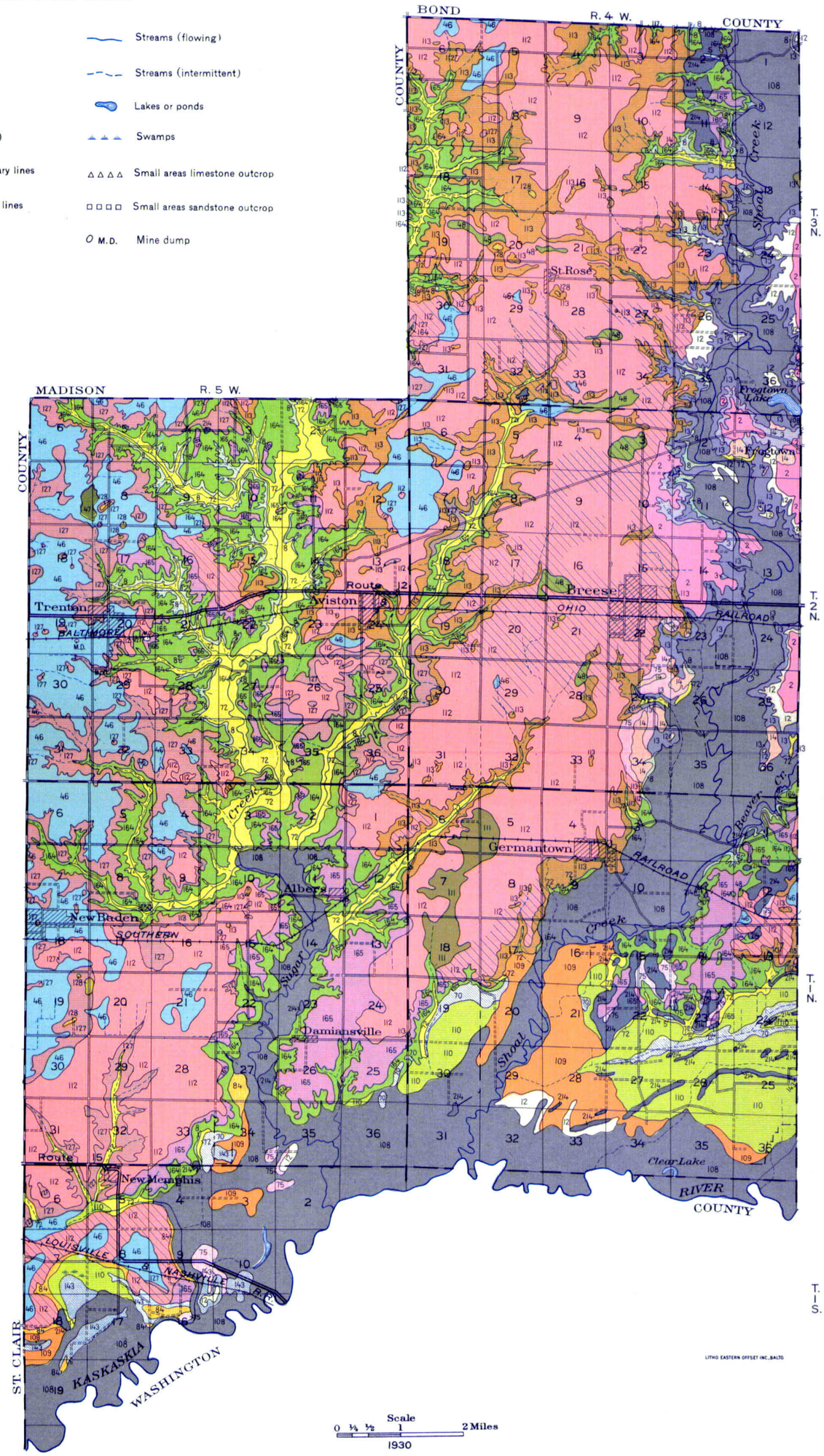
- Lakes or ponds
- Swamps
- Small areas limestone outcrop
- Small areas sandstone outcrop
- M.D. Mine dump

LEGEND

- 1 Rinard silt loam
- 2 Cisne silt loam
- 3 Hoyleton silt loam
- 4 Walton silt loam
- 5 Eroded Silt Loam
- 8 Eroded Gravelly Loam
- 11 Loy silt loam
- 12 Wynoose silt loam
- 13 Bluford silt loam
- 14 Ava silt loam
- 32 De Soto fine sandy loam
- 46 Edina silt loam
- 47 Shiloh silt loam
- 48 Ebbert silt loam
- 70 Beaucoup clay loam (terrace)
- 72 Sharon silt loam (first bottom)
- 75 Drury fine sandy loam (terrace)
- 84 Okaw silt loam (terrace)
- 108 Bonnie silt loam (first bottom)
- 109 Racoon silt loam (terrace)
- 110 Venedy silt loam (terrace)
- 111 Ora silt loam
- 112 Putnam silt loam
- 113 Cox silt loam
- 127 Harrison silt loam
- 128 Douglas silt loam
- 143 Ava sandy loam
- 164 Bluford silt loam (immature phase)
- 165 Wynoose silt loam (immature phase)
- 214 Ava silt loam (immature phase)
- Slick spots occupy over 50 per cent of area



LITHO EASTERN OFFSET INC., BALTO

SOIL SURVEY MAP OF CLINTON COUNTY

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION